to it, the third parallel to the polar axis. They are so effective, that 5 lbs. at a leverage of 20 feet turns the polar axis; $12\frac{1}{2}$ the declination one. A man can raise the telescope from the horizon to the zenith in 20 seconds; two (as both axes must be turned) can reverse it from the east side of the pier to the west in 45 seconds.

The telescope is moved in right ascension by a sector and screw driven by a very effective clock. The regulator of this is so powerful, that an addition of 2 cwt. to its driving-weight only makes it gain six seconds in the hour.

The micrometer has an original mode of illuminating its lines in a dark field, which has been found very suitable for nebulæ.

The spectroscope is on the usual plan, but with special provision for the permanence of its adjustments.

The instrument is also provided with a photographic apparatus, nearly like Mr. De la Rue's celebrated one, which (the small speculum being removed) is placed at the focus of the great speculum. A few trials made with an extemporized one gave pictures which that gentleman considered to be of great promise.

A high opinion is expressed both of the optical and astronomical powers of the instrument.

June 18, 1868.

Lieut.-General SABINE, President, in the Chair.

Prof. Clifton, Dr. J. Barnard Davis, Dr. Duncan, Dr. Pettigrew, Mr. Stone and Mr. Vaux, were admitted into the Society.

The following communications were read:—

I. "A Contribution to the Knowledge of Persulphide of Hydrogen." By A. W. Hofmann, LL.D., F.R.S. Received May 25, 1868.

This remarkable body was first observed by Scheele, and subsequently examined by Berthollet; our knowledge of this substance is, however, more especially due to Thenard, who, soon after the discovery of peroxide of hydrogen, was led also to investigate what was believed to be the corresponding sulphur-compound *. The composition of persulphide of hydrogen has nevertheless remained doubtful. Thenard points out that the specimens analyzed by him, contained variable quantities of sulphur, but always more than would have been met with in a sulphur-compound corresponding to peroxide of hydrogen†.

* Ann. de Chim. et de Phys. vol. xlviii. p. 79.

† Thenard states that all his analyses yielded more than 4 atoms of sulphur for 1 molecule of sulphuretted hydrogen.

If, nevertheless, several modern authors have not hesitated to represent the composition of persulphide of hydrogen by the formula

$$H_2 S_2,$$

with or without a sign of interrogation, their statements are no longer based upon the secure foundation of experience.

Of late peculiar circumstances have again directed the attention of chemists to this remarkable compound. Among the technico-chemical aspirations which the Paris Exhibition has brought to light, none have been received with more satisfaction than the efforts, manifested in a variety of forms, of resuscitating for the purposes of industry the quantities of sulphur buried in the mountains of soda-waste, which accumulate in the neighbourhood of our factories. Chemists have more especially admired the processes by which M. Schaffner on the one hand, and Messrs P. W. Hofmann and P. Buquet on the other, have endeavoured to solve this problem. In certain phases of the reactions utilized for this purpose, enormous quantities of persulphide of hydrogen are frequently produced; and only lately, when visiting the chemical works at Dieuze, where the sulphur is regenerated on a colossal scale, the author of this Note has had an opportunity of experimenting with many kilogrammes of this interesting sulphur-compound.

Under these circumstances the author has examined with great interest a compound which he discovered by accident, and the analysis of which appears to throw some light on the composition of the persulphide.

On adding a cold saturated solution of strychnine in strong alcohol to an alcoholic solution of polysulphide of ammonium, brilliant crystalline spangles soon begin to appear in the liquid, and after twelve hours, the walls of the vessel are covered with beautiful orange-red needles, frequently attaining the length of a centimetre, which, after the removal of the mother-liquor, have to be washed only once or twice with cold alcohol, in order to render them perfectly pure. The crystals are insoluble in water, alcohol, and ether, also in bisulphide of carbon; indeed I have not yet found a solvent from which they could have been recrystallized.

Analysis has led to the formula

$$C_{21} H_{24} N_2 O_2 S_3 = C_{21} H_{22} N_2 O_2, H_2 S_3.$$

Hence the crystals are a compound of 1 mol. of strychnine with 1 mol. of a persulphide of hydrogen, of the composition

$$H_2 S_3.$$

Indeed the strychnine-compound splits up in the sense of the above conception. In contact with concentrated sulphuric acid the orange-red crystals are decolorized, and on addition of a small quantity of water, colourless, transparent, oily droplets of persulphide of hydrogen are separated, sulphate of strychnine remaining in solution. The oily drops remain unaltered for some time, but are ultimately decomposed into sulphur and sulphuretted hydrogen.

The investigation of this sharply defined strychnine-compound, which can be preserved for months without undergoing any decomposition, goes far to prove the existence of a persulphide of hydrogen,

$$H_2 S_3;$$

it is, however, by no means improbable that compounds of hydrogen and sulphur in several proportions may exist.

The formation of the strychnine-compound which I have described, and which I have often prepared with the same result, could not fail to lead to an examination of several other alkaloids in a similar direction. Quinine, cinchonine, brucine, and several other vegetal bases were repeatedly submitted to the action of an alcoholic solution of polysulphide of ammonium, but in no case were similar phenomena observed.

The compound of strychnine with persulphide of hydrogen is remarkable for its insolubility. An alcoholic solution containing 2·03 grs. of strychnine, when mixed with an alcoholic solution of polysulphide of ammonium and allowed to stand for twelve hours, was found to have deposited 2·287 grs. of the red crystals, *i. e.* 87·2 per cent. of the theoretical amount. It deserves to be examined, whether the property possessed by strychnine, of forming so insoluble a compound with persulphide of hydrogen, could not be utilized for the purpose of preparing this alkaloid, and in certain cases even for its detection and separation from other substances with which it might be mixed.

II. "Note on the Anatomy of the Blood-vessel System of the Retina of the Hedgehog." By J. W. Hulke, F.R.S. Received May 26, 1868.

(Abstract.)

This retina is very remarkable for the fact that all the arteries and veins lie upon the inner surface of the membrana limitans interna retinæ, in intimate relation with the membrana hyaloidea; while capillaries only traverse the limitans, receiving a sheath from it, and penetrate the inner layers of the retina. The hedgehog's retina is in this respect a link between the non-vascular retina of fish, amphibia, reptiles and birds, and the vascular retinæ of most mammals.

III. "Researches on Refraction-Equivalents." By J. H. Gladstone, Ph.D., F.R.S. Received May 29, 1868.

Since the paper of the Rev. T. Pelham Dale and myself "On the Refraction, Dispersion, and Sensitiveness of Liquids"*, our researches have been continued from time to time, and a good deal of attention has been paid to the subject in Germany. The permanence of the specific refractive

* Philosophical Transactions, 1863, p. 317.